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Varietal Trials—1951 Season

Twenty-one full scale varietal trials were harvested during the 1951 crushing season. These were carried out in all major districts from Mossman to Nambour and provided much valuable information in assessing the relative value of new seedling productions and imported canes against standard commercial varieties. Queensland on the whole experienced a poor season and naturally the trials were subjected, in most cases, to the same hard conditions which reduced the total crop by nearly two million tons of cane. Marginal differences between varieties were thereby reduced and the results should be regarded with a considerable degree of caution. In South Queensland where most trials were badly frosted, late growers had no opportunity to display their potentialities and c.c.s. figures were adversely affected. It would be unwise

to accept the results from frosted trials as being a true indication of varietal worth.

The Bureau never assesses a variety on its performance in one trial nor in one year. Its true value is found only by observing a number of trials over a group of seasons and determining how often the new cane is superior to the old. Adherence to such a practice gives some guarantee of correct assessment and bears dividends in the ability to recommend only proven varieties.

With the exception of the performance of Q50 in parts of North Queensland and that of N.Co.310 in parts of the South, there is nothing particularly noteworthy in the 1951 series. The superiority of some varieties has been confirmed and others have shown up so poorly over a period of years that they can now be discarded.

LEONARDI AND DE PALMA, Whyanbeel.

Soil Type: Alluvial grey clay.

Age of crop: 13 months.

Nature of crop: Plant cane.

Harvested: September, 1951

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Q.50	31.17	18.51	5.77
Comus	28.70	17.00	4.88
Pindar	27.49	18.62	5.12
Trojan	18.88	18.38	3.47
41 M.Q. 779	18.84	18.68	3.52

DISCUSSION.

Q.50 showed to the best advantage in this trial but there is insufficient evidence for stating that it would be better than either Comus or Pindar in any other trial. There is little to choose between the three, but Q.50 has a possible advantage in its ability to stool well under a wide range of climatic conditions.

Germination was not good in Trojan, 41 M.Q.779 and Pindar and this undoubtedly affected ultimate yields. Comus suffered some damage from rats

and all varieties were adversely affected by the dry season. Q.50 continues to be a promising variety on the second class soils of this area and should become a popular cane on any except the best lands. Characteristic of it are the uniformly good stooling and cover on all soil types. These features are welcomed by the growers since they reduce cultivation and weeding operations to a minimum. Certain of the other varieties in the trial which possess poor covering power are not attractive on that account.

NORTHERN SUGAR EXPERIMENT STATION, Meringa
Block A.5

Soil type: Grey-brown clay loam.

Nature of crop: First ratoon.

Age of crop: 10 months.

Harvested: July, 1951.

SUMMARY OF CROP YIELDS

Variety	Plant Crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
G.273 ..	47.04	15.94	31.18	16.71	78.22	12.71
G.270 ..	43.50	14.99	24.36	16.30	67.86	10.49
Trojan ..	42.66	16.88	21.86	17.20	64.52	10.96
G.362 ..	41.86	15.15	23.88	16.08	65.74	10.18
G.262 ..	38.48	16.66	19.28	17.32	57.76	9.75
G.323 ..	32.59	16.08	21.00	17.24	53.59	8.86

DISCUSSION.

As the results of the plant crop were not discussed in the bulletin of April, 1951, both plant and first ratoon crops are presented together.

Germination of all varieties was good, ranging from 88 to 96 per cent. The yields of the plant crop which were up to 47 tons per acre indicate that growth was favourable and conformed to the good conditions of that year. In the ratoon crop an early start was given by a fall of rain in

September. G.273 was the best early grower and G.262 the worst, the ratoon plots being somewhat patchy. G.273 maintained its lead through the summer months and until growth ceased in April. In the aggregate of the two crops G.273 was an easy winner and it is being propagated rapidly for commercial plantings. The cane has many favourable characteristics and should perform well in future under North Queensland conditions.

NORTHERN SUGAR EXPERIMENT STATION, Meringa, Block A2.

Soil type: Grey to brown clay loam.

Nature of crop: Plant cane.

Age of crop: 12 months.

Harvested: July, 1951.

SUMMARY OF CROP YIELDS

Variety	Cane per acre		c.c.s. in cane	
	Tons	Per cent.	Tons	
H.253	38.05	16.98	6.46	
H.312	35.54	17.87	6.35	
Trojan	28.62	16.74	4.79	
H.302	25.58	17.28	4.42	
H.250	22.68	17.95	4.07	
H.365	21.14	18.54	3.92	

DISCUSSION.

Two varieties which yielded very well in this test are H.253 and H.312. They so far out-yielded the other four as to allow confident expectation of a repetition of their relative performances.

Trojan and H.302 gave fair yields but H.250 and H.365 were not impressive, probably due to their in-

ability to make rapid growth in the early stages of the crop. Stooling was not very good in this trial, H.365 in particular being poor. The yields of 38 and 35 tons per acre for the two best canes were quite good when the poor, wet season is considered. Rarely does North Queensland have such a short growth period.

FOX AND CO., Gordonvale.

Soil type: Red brown loam.

Nature of crop: Second ratoon.

Age of crop: 13 months.

Harvested: October, 1951.

SUMMARY OF CROP YIELDS

Variety	Plant Crop		First Ratoon Crop		Second Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
Q.50 ..	Tons 33.30	per cent. 12.89	Tons 38.39	per cent. 15.29	Tons 38.98	per cent. 16.52	Tons 110.67	Tons 16.60
41 M.Q.779 ..	32.63	12.76	30.56	16.55	28.03	17.34	91.22	14.08
Cato ..	27.40	16.03	29.26	16.79	24.49	18.05	81.15	13.72
D.221 ..	26.84	17.41	27.12	17.06	21.87	17.65	75.83	13.16
D.271 ..	24.19	17.87	28.89	16.61	19.98	17.62	73.06	12.64

DISCUSSION.

In this trial Q.50 has outyielded all the other varieties in each of the plant and two ratoon crops. In both total cane and total sugar produced over the three years it has given a markedly higher tonnage than 41 M.Q.779 which was the closest to it.

The performance of Q.50 on this soil type over a 3-crop cycle has been so outstanding as to point the way to

its more extensive planting. The variety is unsuitable for the better class soils of North Queensland, but when grown on the medium to poorer lands it remains upright, yields heavily and possesses good sugar. The small amount of red rot which is sometimes apparent is important only when the variety is left for late harvesting. Early cut crops remain free of the disease.

Mrs. E. M. STEWART, El Arish, Tully.

Soil type: Grey gravelly to sandy loam. Nature of crop: Plant.

Age of crop: 14 months.

Harvested: July, 1951.

SUMMARY OF CROP YIELDS

Variety				Cane per acre	c.c.s. in cane	Sugar per acre
				Tons	Per cent.	Tons
41 M.Q.779 ..	..	..	..	35.58	16.81	5.98
41 M.Q.764 ..	..	..	..	34.20	15.20	5.20
Q.44 ..	..	..	..	32.45	15.50	5.03
Trojan ..	..	..	..	30.76	15.90	4.89
Q.50 ..	..	..	..	28.95	15.89	4.31
Pindar ..	..	..	..	28.32	17.30	4.90

DISCUSSION.

The two varieties 41 M.Q.779 and 41 M.Q.764 have given good yields for the first crop of this test. Good growing conditions were experienced almost throughout it.

Q.44 and Trojan were the second best yielders with actually very little difference between them and the first two. Q.50 and Pindar gave only low yields but the differences in yield provide insufficient grounds for stating that they would always be lower than the other varieties (with the single exception of 41 M.Q.779). Although planting conditions favoured a rapid germination, Q.50 and Pindar failed to produce an 80 per cent. stand: the other varieties struck well. Good

early progress was noted and the well drained soil was not adversely affected by the torrential rains of November, December and January. The early cessation of the wet season reduced the growing period but yields were reasonably satisfactory. There was little to choose between the first four canes in tonnage of cane per acre and, although 41 M.Q.779 was superior to most of the others in sugar per acre, its habit of lodging will not allow it to become a commercial variety. The industry demands upright varieties and nothing is gained by attempting to popularise canes which lie down under normal conditions.

T. TREMBATH, Bartle Frere.

Soil type: Friable red volcanic loam.

Nature of crop: Plant cane.

Age of crop: 14 months.

Harvested: August, 1951.

SUMMARY OF CROP YIELDS

Variety					Cane per acre	c.c.s. in cane	Sugar per acre
					Tons	Per cent.	Tons
I.426	..	..	..	..	36.01	16.83	6.06
I.405	..	..	..	..	33.26	16.48	5.48
I.421	..	..	..	..	32.21	15.71	5.06
Badila	..	..	..	..	31.30	15.81	4.95

DISCUSSION.

Good average growing conditions were experienced for the first year of this trial—a fact which could fairly be taken to increase the validity of the conclusions drawn from it.

Germinations were fairly good, ranging from 80 to 95 per cent with Badila giving the best strike. I.426 established an early lead and I.405 soon forged ahead of Badila and I.421. The two first-mentioned had

good cover and did not create any cultivation problem. Prior to harvest, I.426 had lodged in two plots, while I.405 was also partially recumbent; the others remained erect. Varieties which lodge with crops of the magnitude of 35 tons per acre are not suitable for commercial planting. Although the crops were sound at harvest the recumbent cane would naturally attract higher cutting rates.

J. SEARLE AND SON, Airdmillan.**Soil type:** Brown alluvial loam.**Nature of crop:** Plant cane.**Age of crop:** 15 months.**Harvested:** August, 1951.**SUMMARY OF CROP YIELDS**

Variety					Cane per acre	c.c.s. in cane	Sugar per acre
					Tons	Per cent.	Tons
F.304	..	..	..	..	37.46	14.10	5.28
S.J.16	..	..	..	..	34.72	15.70	5.45
Q.13	..	..	..	..	31.19	16.61	5.18
E.269	..	..	..	..	30.24	16.01	4.84
E.275	..	..	..	..	29.03	13.64	3.96

DISCUSSION.

The variety F.304, on the data above, is the most promising new one in this trial but it does not differ from the standard variety S.J.16, by an amount sufficient to justify confidence in a repetition of this performance.

Q.13 compares fairly favourably with S.J.16 and F.304 but E.269 and E.275 have not performed very well at all.

This crop was grown where irrigation water was available when required and this fact must influence any decision regarding the usefulness of the varieties tested.

Germination in this trial was unsatisfactory. E.269 and F.304 gave only

a 60 per cent stand and the best striker was S.J. 16 with 84 per cent. Early growth was marred by heavy and continuous rains causing waterlogged conditions. At six months of age Q.13 was the best cane but in later months F.304 caught up and passed it. At harvest the latter was superior to all others except S.J.16 in cane per acre but the high sugar content of Q.13 made it practically equal in sugar. Q.13 is a very sweet cane and its performance is satisfactory compared with the other varieties when one takes into consideration the lower costs of harvesting per acre. This factor is frequently overlooked.

E. C. HINCEN, Lethebrook, via Proserpine.**Soil type:** Alluvial silt loam.**Nature of crop:** First ratoon.**Age of crop:** 11 months.**Harvested:** October, 1951.**SUMMARY OF CROP YIELDS**

Variety	Plant crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
Trojan ..	53.57	15.77	18.88	17.11	72.45	12.05
Q.49.. ..	53.50	15.63	27.56	15.64	81.06	12.65
Pindar ..	50.31	16.45	24.88	16.88	75.19	12.48
Q.47.. ..	44.94	15.17	24.88	16.88	69.82	11.11
Q.45.. ..	44.00	15.72	19.25	18.34	63.25	10.34
Badila ..	28.00	15.11	8.69	17.72	36.69	5.80

DISCUSSION.

This trial was ratooned in November, 1950, and harvested 11 months later. In the early stages of development Pindar was ahead of other varieties while Trojan and Badila were the most backward. The good growing conditions to late February resulted in good development for three months but the dry period which then set in prevented a heavy crop being grown. Grub damage affected all

varieties. At harvest Q.49, Pindar and Q.47 were well ahead of the others. The two crops together showed Q.49, Pindar and Trojan in the leading places in terms of sugar per acre, with little to choose between them. It is noteworthy that on this good quality Lethebrook soil Badila was outclassed by all of the newer canes.

SUGAR EXPERIMENT STATION, Mackay, Block A5.

Soil type: Grey silty clay loam.

Nature of crop: First ratoon.

Age of crop: 13 months.

Harvested: October, 1951.

SUMMARY OF CROP YIELDS

Variety	Plant Crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
G.105 ..	35.74	16.27	27.70	18.70	63.44	11.00
Q.50 ..	33.50	15.25	26.35	18.22	59.85	9.91
G.112 ..	33.38	14.55	27.48	16.78	60.86	9.47
G.176 ..	29.42	16.50	17.02	18.21	46.44	7.95
G.101 ..	29.30	16.88	28.05	18.15	57.35	10.04
G.104 ..	27.06	15.54	22.48	17.08	49.54	8.04
G.177 ..	25.29	16.39	16.08	17.97	41.37	7.03

DISCUSSION.

After ratooning in September all varieties made favourable progress and were out of hand by the end of December. There was nothing to choose at any stage between G.101, G.105 and G.112, nor could any of these be selected as superior to Q.50. The other varieties in the trial were obviously of lesser yielding capacity.

The summation of two crops shows that G.101 and G.105 are the best in terms of sugar per acre but Q.50 is very close behind. Both of these G. seedlings as well as G.112 have been selected for further trials.

Their performance against Q.50 in a different set of seasons will be watched closely.

SUGAR EXPERIMENT STATION, Mackay, Block C3-6.

Soil type: Grey silt loam.

Nature of crop: Second ratoon.

Age of crop: 10½ months.

Harvested: September, 1951.

SUMMARY OF CROP YIELDS

Variety	Plant Crop		First Ratoon Crop		Second Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
Q.50 ..	Tons 25.67	Per cent. 15.88	Tons 37.58	Per cent. 16.76	Tons 24.75	Per cent. 18.79	Tons 88.00	Tons 15.03
Pindar ..	25.07	15.72	22.00	16.90	14.58	18.24	61.65	10.31
Co.301 ..	22.92	15.28	40.20	14.89	26.36	17.22	89.48	14.03
Q.49 ..	22.41	14.28	21.68	15.29	12.28	16.94	56.37	8.60
C.P.29/116	21.31	15.50	34.47	15.97	26.12	17.19	81.90	13.29
Q.47 ..	20.16	15.37	26.49	15.59	17.24	17.87	63.89	10.11

DISCUSSION.

The three varieties Q.50, Co.301 and C.P.29/116 have given quite high yields in this trial and it could confidently be expected that any one of them would outyield the other three—Q.47, Pindar and Q.49.

After harvesting in November, 1950, the second ratoons came away well and made good early growth. It was apparent that Co.301, C.P.29/116 and Q.50 were the best canes in this crop and they maintained their lead

until harvest in September, 1951.

In the aggregate of the three crops Q.50 produced 15 tons of sugar per acre, which is a creditable performance on this second-class land. There was little to choose between C.P.29/116 and Co.301 but the better agricultural qualities of the former would make it the better cane. Its resistance to red rot is noteworthy under conditions which favour development of the disease in Q.50.

SUGAR EXPERIMENT STATION, Mackay, Block D2.

Soil Type: Grey silt loam

Nature of crop: First ratoon.

Age of Crop: 11½ months.

Harvested: October, 1951.

SUMMARY OF CROP YIELDS

Variety	Plant Crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
Q.50.. ..	Tons 40.90	Per cent. 16.83	Tons 23.55	Per cent. 18.51	Tons 64.45	Tons 11.24
B.174 ..	37.76	17.49	18.16	17.18	55.92	9.72
E.119 ..	37.70	15.25	17.70	15.71	55.40	8.53
E.129 ..	34.83	16.24	22.46	17.81	57.29	9.65
E.135 ..	28.70	15.58	20.45	18.68	49.15	8.26
Q.47.. ..	26.47	16.21	17.70	16.84	44.17	7.28

DISCUSSION.

From date of ratooning in early November until the end of February the trial grew well but growth slowed down with the lack of rain in late summer and autumn. Waterlogging as a result of the very heavy January rains did not allow full advantage to be taken of January and February growing temperatures and this is reflected in the relatively light yields in

a 12 months crop. Q.50 and E.129 were practically equal in yield in the ratoons but the aggregate of both crops puts Q.50 in an unassailable position. This variety is difficult to surpass on these second class Mackay lands, and there is still no variety in sight which is likely to oust it from its favoured position in the district.

B. GRAHAM, Pleystowe, Mackay.

Soil type: Brown sandy alluvial.

Nature of crop: First ratoon.

Age of crop: 22 months.

Harvested: July, 1951.

SUMMARY OF CROP YIELDS

Variety	Plant Crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
Q.50.	49.70	15.92	36.52	13.50	86.22	12.84
Comus	44.21	10.99	27.38	13.99	71.59	8.69
P.O.J.2725 . .	43.46	12.19	30.71	14.75	74.17	9.83
B.174	43.09	13.55	37.34	16.58	80.43	12.03
Eros.	41.12	14.58	18.99	15.17	60.11	8.88
H.Q.426	38.16	14.60	15.19	13.50	53.35	7.62

DISCUSSION.

The yield results of the standover crop of this trial are in fair agreement with the conclusions regarding the varieties as stated in the Quarterly Bulletin for January, 1950.

Some useful information about the behaviour of a standover crop is provided. A c.c.s. test of the cane was taken at the time it should normally have been harvested (14 months after ratooning) as first ratoon. A comparison of those figures with the c.c.s. figures provided by the harvest itself shows that there has been little or no change in the c.c.s. in the 8 months of second year growth. The low figures for total sugar per acre

shown in the table are thus due almost entirely to the low production of cane per acre and this has been brought about by the excessive lodging and dying of the stalks.

In the aggregate B.174 and Q.50 are the best canes in the trial. All of the varieties included had some claim to early maturity or high early sugar but it is notable that H.Q.426 and Eros were among the worst performers for the two-year cropping. Standover cane is not a normal crop in this area and conclusions should not be drawn from trial results under such unusual conditions.

SUGAR EXPERIMENT STATION, Bundaberg, Block A2.**Soil type:** Red volcanic.**Nature of crop:** Second ratoon.**Age of crop:** 12½ months.**Harvested:** October, 1951.**SUMMARY OF CROP YIELDS**

Variety	Plant Crop		First Ratoon Crop		Second Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Per cent.	Tons	Tons
F.18 ..	29.60	12.70	49.76	12.20	52.68	15.76	132.04	18.10
F.16 ..	20.30	12.75	47.16	13.52	45.05	16.96	112.51	17.72
F.31 ..	28.30	11.95	47.46	12.78	56.08	14.41	131.84	17.52
F.35 ..	27.39	14.20	49.86	12.86	51.57	16.60	128.82	18.86
F.27 ..	26.89	13.90	45.95	13.42	43.34	16.61	116.18	17.11
Q.49 ..	24.98	13.50	48.66	12.77	48.36	16.38	122.00	17.50
F.49 ..	24.38	14.30	47.46	13.74	49.16	17.13	121.00	18.41
F.14 ..	24.18	13.50	42.84	13.68	49.67	16.95	116.69	17.54
F.25 ..	23.98	14.70	47.66	13.63	44.65	17.47	116.29	17.80
F.33 ..	22.78	13.10	44.15	13.87	49.26	16.16	116.19	17.06
F.60 ..	22.68	16.30	48.26	11.55	34.12	16.18	105.06	14.56

DISCUSSION.

The "F" selections tested in this trial were a very even lot indeed and F.60 appears to be the only one which has not reached a satisfactory yield standard. The remainder are fairly evenly distributed about Q.49, whose yield is close to the average of them all. None of these canes appears out-

standing in either yield or sugar content when compared with the standard cane Q.49. Perhaps the most outstanding feature of this trial is the very high average yield for second ratoon cane on red volcanic soil in a "dry" year.

SUGAR EXPERIMENT STATION, Bundaberg, Block B3.**Soil type:** Red volcanic loam.**Nature of crop:** Second ratoon.**Age of crop:** 12 months.**Harvested:** September, 1951.**SUMMARY OF CROP YIELDS**

Variety	Plant Crop		First Ratoon Crop		Second Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Per cent.	Tons	Tons
C.P. 29/116	31.70	11.2	45.72	14.52	44.65	14.58	122.07	16.70
Q.47 ..	30.33	15.5	40.12	14.95	35.47	15.76	105.92	16.28
Q.49 ..	25.66	14.2	37.03	14.25	31.12	15.71	93.81	13.81
Pindar ..	21.29	17.0	35.41	16.12	29.98	18.11	86.68	14.76

DISCUSSION.

It can be stated quite confidently that C.P.29/116 is the best of the four varieties tested, with Q.47 yielding only slightly less in terms of sugar per acre over the three crops.

Ratooning conditions in 1950 were favourable and good early summer rains gave a good start to the crop. Although a dry spell caused cessation of growth at the end of the year the mid-January rains produced further good development and by March,

1951, it was obvious that C.P.29/116 would outyield the other varieties. The aggregate of 16.7 tons of sugar per acre over three crops was very favourable under dry farming conditions. The relatively poorer performance of Pindar was previously forecast; this cane cannot stand up to the dry spells experienced in South Queensland and is not recommended except for irrigated farms or good alluvial flats.

BLACK BROS., Barolin Road, Bundaberg.

Soil type: Red sandy loam.

Nature of crop: Plant cane.

Age of crop: 13 months.

Harvested: October, 1951.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
H.18	23.68	14.91	3.53
N.Co.310	21.48	17.78	3.82
H.52	19.93	13.70	2.73
Q.47	19.72	14.00	2.76
H.47	16.40	11.95	1.96
H.17	16.12	10.92	1.76

DISCUSSION.

Germination of all canes in this trial was excellent, ranging from 94 to 98 per cent. The stooling of H.17 and H.47 was poor and their early cover weak. H.18, N.Co.310 and Q.47 stoolled well and the two first-mentioned made the best progress in the early stages of the crop. Although this trial was on an irrigated farm failure to water the block regularly during the hotter months resulted in the crop suffering severely at several periods. The entire trial was frosted

badly in late July and N.Co.310 and Q.47 stood out as the most frost resistant varieties. The best yielder at harvest, H.18, had the growing point killed by frost but the eyes were unaffected. H.18 was at all times the most promising cane in the trial; its cover and stooling were good. N.Co. 310 produced the most sugar per acre by virtue of its high sugar content; when harvested in October it was nearly four units higher than Q.47—a notable achievement.

E. C. THIELE, Barolin Road, Bundaberg.**Soil type:** Red sandy loam.**Nature of crop:** First ratoon.**Age of crop:** 12 months.**Harvested:** October, 1951.**SUMMARY OF CROP YIELDS**

Variety	Plant Crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
F.60 ..	34.45	15.40	24.20	12.11	58.65	8.23
F.18 ..	32.80	15.45	28.60	11.15	61.40	8.26
C.P.29/116 ..	31.15	15.30	33.00	10.70	64.15	8.30
F.25 ..	28.05	16.15	23.85	12.29	51.90	7.46
F.14 ..	25.05	15.65	25.35	12.07	50.40	6.98

DISCUSSION.

After the harvesting of the plant crop in November, 1950, all varieties except F.60 ratooned normally. The latter, which had yielded best in the plant crop, was abnormally slow and failed to make appreciable growth before February. F.18 was the most vigorous cane but it lacked the good stooling of C.P.29/116. The severe winter frosting killed the growing points of all varieties but buds were

undamaged. In the aggregate of the two crops F.18, F.60 and C.P.29/116 performed equally well in sugar per acre and there is nothing to suggest at this stage that either of the newer canes would be preferable to the district standard. The difference in c.c.s. suggests that F.60 may be earlier maturing but this would need to be confirmed by further tests.

D. E. REHBEIN, Duncraggan Road, Rubyanna.**Soil type:** Red volcanic loam.**Nature of crop:** Plant crop.**Age of crop:** 12 months.**Harvested:** September, 1951.**SUMMARY OF CROP YIELDS**

Variety					Cane per acre	c.c.s. in cane	Sugar per acre
					Tons	Per cent.	Tons
H.20					13.77	13.58	1.87
H.45					13.42	15.05	2.02
H.19					11.61	12.58	1.46
H.25					9.58	12.84	1.23
H.64					8.22	14.48	1.19
H.42					7.94	16.25	1.29
H.62					7.90	14.18	1.12
H.46					7.85	14.65	1.15

DISCUSSION.

The planting conditions of this trial were harsh and unfavourable to a good strike. Despite this germinations ranging from 73 to 92 per cent were obtained. Subsequent growth was never good and the crop, which was on a very dry piece of land, failed to make good headway. Most of the seedling varieties in the trial are thin

hardy types and some indication of their ability to survive under such conditions is given by the fact that the standard cane Q.49 failed to produce any cane in two of the plots. It is not reasonable to draw conclusions from such a trial and it will be necessary to examine these canes further in a more normal season.

BINGERA PLANTATION, Bingera, Block Mitchell's 3.

Soil type: Red sandy loam.

Nature of crop: Plant cane.

Age of crop: 24 months.

Harvested: September, 1951.

SUMMARY OF CROP YIELDS

Variety	Cane per acre		c.c.s. in cane	
	Tons	Per cent.	Tons	
Q.55	56.33	13.21	7.44	
Vesta	50.50	13.23	6.68	
Q.50	45.75	11.61	5.31	
Q.47	41.25	14.16	5.84	
Pindar	40.92	12.02	4.92	
Eros	35.67	13.06	4.66	
Akbar	24.08	12.83	3.09	

DISCUSSION.

This was a 24-month-old standover plant crop which was not harvested due to wet conditions.

Q.55 and Vesta gave best yields in tons cane and tons sugar, but this result may have been unduly influenced by the standover conditions which appeared to suit these two varieties best.

In the second growth year Q.50 developed considerable red rot, which

is in line with previous experience. Q.47 arrowed in the first year and, in consequence, the crop became "side-shot" and rather ragged. Much dead cane was noticed in Pindar, which could not stand up to dry spells. The yield of nearly $7\frac{1}{2}$ tons of sugar per acre was not particularly good for a 24 months irrigated crop and suggests that irrigation was not nearly up to requirements of the crop.

O. A. GAHNSTROM, South Isis, via Childers.

Soil type: Red volcanic loam.

Nature of crop: Plant cane.

Age of crop: 13 months.

Harvested: October, 1951.

SUMMARY OF CROP YIELDS

Variety	Cane per acre	c.c.s. in cane	Sugar per acre
	Tons	Per cent.	Tons
Q.55	24.32	16.53	4.02
Co.419	22.56	15.12	3.41
N.Co.310	16.90	19.05	3.22
C.P.29/116	16.76	15.57	2.61
Pindar	15.70	18.22	2.86
A.147	14.42	16.64	2.40

DISCUSSION.

Subsequent to planting in September, 1950, a good germination was obtained, the fastest being Q.55 and Co.419; Pindar was slow and A.147 was somewhat weak. The two first-mentioned established an early lead. A.147 was not impressive at any stage despite good stooling. N.Co.310 stoolled

very well but failed to grow favourably under the conditions of the trial. This should not be considered as the final word on this introduced variety since it yielded equally as well as C.P.29/116, which is a valuable cane in this area. The results of the ratoon crops will be watched with interest.

M. B. GOODLIFFE, North Isis.

Soil type: Red volcanic loam.

Nature of crop: First ratoon.

Age of crop: 9 months.

Harvested: August, 1951.

SUMMARY OF CROP YIELDS

Variety	Plant Crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
Q.51	53.01	14.85	32.25	14.51	85.26	12.55
Q.50	51.18	15.30	34.19	15.27	85.37	13.05
C.P.29/116	42.22	13.80	37.24	11.25	79.46	10.02
Pindar	39.78	17.00	24.47	15.61	64.25	10.58
Q.47	38.97	14.70	25.94	15.57	64.91	9.77

DISCUSSION.

Although all varieties ratooned well C.P.29/116 and Q.50 forged ahead in the early stages; Pindar was least impressive. Crop development was rapid in the summer months but the short wet season resulted in early cessation of growth. The severe winter caused heavy frost damage and all varieties except Q.47 had the growing point killed. This high degree of resistance to frost is important in the Southern districts.

In the aggregate of the two crops Q.50 and Q.51 were outstanding and the excellence of their performance can be gauged by the margin separating them from C.P.29/116. It is significant to note, however, that in 1951, a dry year, the C.P. was the best performer in terms of cane per acre; the higher c.c.s. of the other varieties placed them high on the list for sugar per acre.

G. F. THOMASON, Nambour.**Soil type:** Grey silty loam.**Nature of crop:** First ratoon.**Age of crop:** 12 months.**Harvested:** September, 1950.**SUMMARY OF CROP YIELDS**

Variety	Plant Crop		First Ratoon Crop		Summary	
	Cane per acre	c.c.s. in cane	Cane per acre	c.c.s. in cane	Total cane per acre	Total sugar per acre
	Tons	Per cent.	Tons	Per cent.	Tons	Tons
Q.50.. ..	36.71	15.03	35.77	13.92	72.48	10.50
Pindar ..	32.82	15.57	35.71	15.04	68.53	10.48
N.Co.310 ..	31.53	15.88	48.85	15.58	80.38	12.61
Q.47.. ..	29.94	14.51	38.30	13.92	68.24	9.75
C.P.34/79 ..	28.87	15.33	32.06	14.78	60.93	9.08

DISCUSSION.

Following harvesting of the plant crop N.Co.310 was the first to ratoon; it had volunteered through the trash before the tops were burnt off. This variety maintained its lead throughout the crop period. A flood in January covered all varieties but permanent damage was not appreciable. By May there were signs that N.Co.310 would arrow, but very few flowers emerged. When harvested in September,

N.Co.310 was outstanding in cane per acre and its c.c.s. was appreciably higher than the next best cane, Pindar. The yield of 7.61 tons of sugar per acre for this variety was an excellent performance in what was not a good year. Unfortunately N.Co.310 appears very susceptible to Fiji disease and its wider planting may have to be restricted until this disease has been eradicated from the area.

Bulletin on Weedicides

A Farm Bulletin dealing in some detail with the control of weeds and grasses by 2,4-D will soon be published by the Bureau. This publication should be of great value and assistance to canegrowers who are interested in chemical weed control and in particular to those who are considering constructing their own boom sprays.

The publication, which will be profusely illustrated, deals with the principles of both pre-emergence and contact sprays and gives in consider-

able detail a lot of valuable information on pumps, booms, nozzles, pressure requirements, etc. This Bulletin has been prepared by the Asst. Director (Mr. L. G. Vallance) and should be in the hands of every grower interested in this subject.

It will be available, free, from any of our Sugar Experiment Stations or country officers, whose addresses will be found inside the front cover of this Quarterly Bulletin. It can also be forwarded from the Bureau Head Office on request.

—N.J.K.

Soil Fertility Investigations

RESULTS OF THE 1951 SEASON

By L. G. VALLANCE

An outstanding feature of the 1951 season was the unfavourable weather conditions which prevailed in most districts. The unfortunate extremes of very wet and very dry weather which occurred in the early and late stages respectively of the growth of the crop seriously reduced yields of both cane and sugar. At the same time it affected the farm trial programme, and erratic growth spoilt the chance of obtaining conclusive results in some carefully laid out experiments. This was particularly true of the raw rock phosphate trials in which interesting trends were reported in the plant crops of last year and in which the behaviour of the ratoons was most important.

In addition to the overall reduction in returns due to inclement weather, profits per acre were vitally affected by rapidly mounting increases in cost of production occasioned by steep rises in the cost of farm labour, fertilizers and all items of equipment. The impact of this fell on all farms, large and small, and there is no doubt that any avenue which might lead to a reduction in production costs is worthy of close scrutiny. In this respect correct fertilizer usage is important since, not only does this material constitute a major item of annual expense, but it can appreciably influence the profit or loss per acre. The several trials which were harvested this year on farm properties bear ample testimony to the advantages to be gained from ascertaining the right type of fertilizer required and its usage in adequate but not necessarily excessive amount. Particular attention is drawn to the fertilizer trial at Moresby in the Innisfail district in

which, with the completion of the second ratoon harvest it has been possible to work out a profit and loss account for the three crops of a complete cycle.

In general the trials indicate the necessity for using sufficient sulphate of ammonia and, once again the need for potash fertilizer overshadows that for superphosphate. For some time now, many observations and trials have indicated that our soils are becoming more deficient in potash than phosphate. When many of our cane lands were originally brought under cultivation the phosphate requirement was greater than that of potash. Because of this the use of high phosphate fertilizer became routine practice and over the period of years many farmers have automatically ordered such mixtures without pausing to consider whether their requirements had changed. Clearly it is unwise to pursue such a policy indefinitely, particularly when an analysis will readily indicate the present plant food content of the soil. The soil testing service provided by the Bureau is free, and available to all farmers. The necessary arrangements may be made by the grower taking the soil samples himself and forwarding them to this office (see Procedure for Taking Soil Samples on page 136 of this Bulletin) or by getting in touch with the local Bureau officer stationed in his district.

The Bureau is grateful to those growers whose co-operation made the carrying out of these fertilizer trials possible. Our thanks are also due to Messrs. A.C.F. & Shirleys Fertilizers Ltd., who were good enough to supply the required fertilizer free of charge.

FERTILIZER TRIALS

Messrs. ROBINO BROS.' FARM, Babinda.

Soil type: Granite gravel.

Age of crop: 14 months.

The stubble of the previous crop was ploughed out in October, 1949, and the block then planted to cowpea (Reeve's Selection). This grew well and was turned in during April, 1950. The cane was planted in the following August and although germination was somewhat slow, a good even strike was obtained.

The treatments consisted of 27 different combinations of the following amounts of fertilizer:—

Sulphate of ammonia—(a) nil, (b) 200 lbs. per acre, (c) 400 lbs. per acre.

Superphosphate—(a) nil, (b) 200 lbs. per acre, (c) 400 lbs. per acre.

Muriate of potash—(a) nil, (b) 120 lbs. per acre, (c) 240 lbs. per acre.

When the crop, which averaged about 34 tons per acre, was harvested

Nature of crop: Plant cane (Trojan).

Harvested: October, 1951.

it was found that the application of phosphate or potash had not brought about an increase in yields. This was not altogether unexpected in plant cane growing on a soil which had been well fertilized for the preceding crops over the years. In this respect the behaviour of the ratoon crop will be watched with interest.

That these gravelly granitic soils are deficient in nitrogen was illustrated by the fact that the high sulphate of ammonia application (400 lbs. per acre) increased the yield by about 4 tons of cane per acre even though the land had had a good green manure crop turned in prior to planting. When sulphate of ammonia was used at the rate of 200 lbs. per acre most plots showed an increased yield but in some cases the increases were too small to be of much significance.

Mr. G. FORMILAN'S FARM, Mundoo.

Soil type: Red volcanic.

Age of crop: 11 months.

The cane on this trial gave a fair strike and made moderately good early growth. Exceptionally heavy rains were experienced in November, December and January and the consequent saturated condition of the soil brought about a cessation of growth of the young cane. After the rains, recovery was fair and the plots at harvest averaged about 23 tons per acre.

In order to test the response to fertilizer, various combinations of sulphate of ammonia, superphosphate and muriate of potash were used in the amounts already stated for the trial described above.

As is often the case with red volcanic soils a substantial increase in tonnage was obtained from the application of potash and the yields of the

Nature of crop: Plant cane (H.Q.426).

Harvested: August, 1951.

various treatments of this fertilizer are as follows:—

No potash—21.26 tons cane per acre.

120 lbs. potash per acre—21.90 tons cane per acre.

240 lbs. potash per acre—25.23 tons cane per acre.

Unfortunately, it was not possible to have the cane from the various plots analysed and therefore the effect of the potash upon the c.c.s., which is sometimes considerable, could not be determined. No response to nitrogen or superphosphate was obtained. However, a green manure crop had been turned in prior to planting and it is probable that the first ratoon crop will show a greater demand for nitrogenous fertilizer.

Mr. S. PAGANO'S FARM, Moresby.**Soil type:** Red schist sandy loam.**Age of crop:** 12 months.**Nature of crop:** Second ratoon (H.Q. 426).**Harvested:** July, 1951.

This trial has now completed the plant, first ratoon and second ratoon crops. The complete figures for the three crops are of great interest when the monetary values of the increased yields, due to the various amounts of fertilizer used, are compared. These are given in the table below. The left hand column shows the amounts of the various types of fertilizer used per acre while the right hand column gives the values of the increases in crop tonnage per acre that were brought about by the application of

the different fertilizers. These values refer to the aggregate of three crops, i.e., plant crop in 1949, first ratoon crop in 1950 and second ratoon crop in 1951, and have been calculated from the ruling prices for cane in those years according to c.c.s. content. The cost of the fertilizer has been deducted and also the cost of handling the increased crop insofar as cutting and transport are concerned. Costs which were incurred, irrespective of the various fertilizer treatments such as planting, cultivation, grub control, etc., have not been taken into account.

FERTILIZER APPLIED (lb. per acre) (per annum)			Increase in Return per acre for Three Crops
Sulphate of Ammonia	Super- phosphate	Potash	
nil	nil	150	£ s. d. (Gain)
"	"	300	4 2 6
"	210	nil	14 7 6 "
"	210	150	19 12 6 "
"	210	300	3 17 6 "
"	420	nil	1 17 6 (Loss)
"	420	150	15 12 6 (Gain)
"	420	300	9 12 6 "
210	nil	nil	1 15 0 (Loss)
210	nil	150	37 2 6 (Gain)
210	nil	300	51 15 0 (Gain)
210	210	nil	45 10 0 "
210	210	150	35 2 6 "
210	210	300	29 15 0 "
210	420	nil	50 7 6 "
210	420	150	42 7 6 "
210	420	300	44 5 0 "
420	nil	nil	18 5 0 "
420	nil	150	14 10 0 "
420	nil	300	48 10 0 "
420	210	nil	44 10 0 "
420	210	150	45 10 0 "
420	210	300	88 0 0 "
420	420	nil	51 2 6 "
420	420	150	45 17 6 "
420	420	300	73 5 0 "
420	420	300	52 2 6 "

The value of correct fertilizing is evident from these figures, which indicate that by far the most profitable return was obtained when 420 lbs. of sulphate of ammonia, plus 210 lbs. of superphosphate, plus 150 lbs. of

muriate of potash was applied per acre to each of the three crops. This application increased the value of the crops (after deducting fertilizer and harvesting costs) by £88 in the aggregate, or £29/6/8 per acre per year.

Mr. W. BIGGS' FARM, Proserpine.

Soil type: Sandy loam—forest.

Age of crop: 12 months.

Nature of crop: First ratoon (Q50).

Harvested: October, 1951.

As was the case for the plant crop, an excellent response was obtained from the use of sulphate of ammonia. The yields in tons of sugar per acre for both plant and first ratoon, due to the various applications of this fertilizer, are as follows:—

Sulphate of ammonia lb. per acre	Yield of sugar, tons per acre		
	Plant crop	First ratoon	Total
nil	3.95	1.95	5.90
200	5.73	3.33	9.06
400	6.53	4.19	10.72

Potash response in this first ratoon was not as well marked as that obtained in the plant crop although its nature was somewhat similar. The lighter dressing of potash (120 lbs. per acre) gave an increase of 0.16 tons of sugar per acre, but the heavier application (240 lbs. per acre) gave no further increase. As this effect was also noted in the plant crop, apparently the smaller amount was all that was necessary to counteract any soil deficiency.

That the soil was well supplied with phosphate was indicated by the lack of response to superphosphate in both crops.

ESTATE OF A. E. KELLY & SONS' FARM, North Isis.

Soil type: Red volcanic loam.

Age of crop: 12 months.

Nature of crop: First ratoon (Q47).

Harvested: August, 1951.

The excellent response to sulphate of ammonia, which was obtained in the plant crop was again repeated in the first ratoon. The results are as follows:—

Sulphate of ammonia lb. per acre	Yield of sugar, tons per acre		
	Plant crop	First ratoon	Total
nil	5.79	2.27	8.06
160	6.18	3.00	9.18
320	6.43	3.42	9.85

The above figures indicate that the application of 160 lbs. of sulphate of ammonia to each crop increased their combined yield by 1.12 tons of sugar per acre. Where the heavier dressing of 320 lbs. was used the increase amounted to 1.79 tons of sugar per acre.

A marked response was also obtained by the application of potash. Many years of experimentation and practical observation have indicated the necessity for applying adequate

amounts of potash to red volcanic soils and the result of this trial is but further proof of this important fact. It was pointed out in last year's report (Quarterly Bulletin, April, 1951) that the yields of the potash plots varied rather too much to enable definite conclusions to be drawn. This often happens with plant cane where residual fertilizer from the previous crop cycle still has some effect or there is a slight build up of plant food availability during the fallow period prior to planting.

However, this low temporary supply was quickly exhausted and the

necessity for potash fertilizer was definitely revealed by the first ratoon harvest. The yields due to potash are as follows:—

Muriate of potash lb. per acre	Yield of sugar, tons per acre		
	Plant crop	First ratoon	Total
nil	6.06	2.64	8.70
144	6.02	2.90	8.92
288	6.32	3.15	9.47

As in the plant cane, superphosphate again did not produce any beneficial results.

Mr. V. SUOSAARI'S FARM, Bli Bli, Nambour.

Soil type: Brown alluvial clay loam.

Age of crop: 12 months.

Nature of crop: Plant cane (Q50).

Harvested: October, 1951.

A previous trial on somewhat similar soil in the Nambour area indicated the necessity for applying adequate amounts of sulphate of ammonia. This experience was again repeated when the plant crop of the above experiment was harvested. The figures showed that an application of 200 lbs. of sulphate of ammonia resulted in an increased yield of 1.17 tons of sugar per acre over and above those plots which received none of this essential plant food. The heavier dressing (400 lbs. per acre) caused an even more

pronounced increase of 1.36 tons sugar per acre.

There were indications of a response also to muriate of potash but the differences due to the various applications were somewhat variable and no reliable conclusions can be drawn at this stage. The trial will be ratooned to see what further evidence the subsequent crops provide.

There was no indication of any beneficial response due to superphosphate application.

Lime Trials

The plant crops of a series of lime trials which had been laid down in several areas were harvested during the year. Experiments designed to determine the value of lime applications, particularly on the more acid soils have been a regular feature of the soil fertility investigations carried out by the Bureau over a long period of years. The results indicate that, while spectacular increases are seldom ob-

tained, periodic applications of moderate amounts of lime are definitely beneficial and in many areas are necessary to maintain the productive capacity of the soil at a satisfactory level. Growers in general are aware of this fact and to date the regular trials and surveys indicate that there appears to be very little loss of production due to deficiencies in this respect. This is as it should be, but it is

only by keeping a close watch on the situation that the *status quo* can be maintained, therefore farmers are strongly urged to freely avail themselves of the soil testing services provided by the Bureau.

The series of trials recently harvested differed somewhat from those previously used in that an attempt was made to determine whether a light dressing in the cane drill itself prior to planting would be as effective as the usual heavier dressing applied broadcast. If such were the case an appreciable reduction in the cost of lime application might be possible. At this present stage, of course, when the plant crop only has been harvested it is not yet possible to reach any definite conclusion since the behaviour of ratoon crops are most important in this respect.

However, to briefly summarise the results and to give some indication of

the probable trend it may be stated that out of the 17 replicated trials which were harvested,—

14 trials showed that 2 tons lime broadcast gave higher yields than no lime,

12 trials showed that 10 cwt. lime in drill gave higher yields than no lime,

14 trials showed that 2 tons of lime broadcast was better than 10 cwt. in drill.

In general, the differences in yield were small, and since in some cases they were not large enough to be significant, they must, at this stage, be regarded as indicating trends only. In order to convey some idea of the magnitude of the differences due to the various treatments, their average yields in the different districts are given below.

Treatments (per acre)	District Averages (tons Cane per Acre)			
	Cairns (5 Trials)	Innisfail (5 Trials)	Mackay (4 Trials)	Bundaberg (3 Trials)
2 tons lime broadcast	28.16	32.04	22.64	29.88
10 cwt. lime in drill	25.83	30.74	21.66	30.23
5 cwt. lime in drill	24.89	31.49	20.47	29.13
No lime	24.50	30.05	20.93	29.70

New Bureau Glasshouses

The Bureau has recently taken delivery of three pre-fabricated glasshouses imported from England. These are a relatively new idea in glasshouse construction, the frames being fabricated entirely from aluminium alloy. No wood is used in the structure, and they should possess a long life under Queensland coastal conditions, which are conducive to rather rapid deterioration of wood and steel in exposed situations.

One of the units will be erected on the Lower Buidekin Sugar Experiment Station at Ayr for the normal

routine work of seedling raising, but the other two have been specifically designed for investigational work in Brisbane. These latter will be erected on the Domain which is a few minutes' walking distance from the Head Office of the Bureau. Both agronomic and pathology studies will be conducted in one of them while the other will be utilised for Fiji resistance trial work. They will fill a long-felt need in Bureau research, which has been hampered for many years by the lack of facilities for controlled studies of this nature.

—N.J.K.

Wasted Plant Foods*

By NORMAN J. KING

For a period of at least twenty years the Bureau has attempted to impress the sugar industry, both by precept and practice, with the importance and value of molasses as a soil amendment. My purpose in addressing this conference on the subject today is to indicate the losses industry is incurring by present methods of disposal and to point to more efficient usage within the industry structure.

It is axiomatic that a mill's cane supply is only so good as the lands which grow it. And it would appear to be only common sense that a by-product of manufacture which contains much of the plant foods taken from the soil should be returned to that soil to produce more cane. In every avenue of agricultural or pastoral endeavour there is a net loss to the land since the production of any economic product, whether it be sugar cane, cotton, beef, milk or wool, is automatically followed by the removal of that product from the land to its natural market. In the pastoral industries the loss is appreciably lessened as the animal returns to the soil most of the food it has eaten, but in agriculture the loss is considerable though rarely fully appreciated.

Sugar cane is a bulky crop when considered in terms of tonnage per unit area, and it absorbs during its development large quantities of plant nutrients. It is of considerable importance in these days of both scarcity and high prices of fertilizers that we should look at the income and expenditure account of our plant foods. The standing, mature cane contains all of the plant foods which the crop has extracted from the soil, although not all of this is taken to the factory. It can be calculated that in the stalks of

a six million ton cane crop there is the equivalent of

17,700 tons of sulphate of ammonia,
12,300 tons of superphosphate, and
8,400 tons of muriate of potash.

These are startling figures and the annual removal of such quantities of the three major plant nutrients from the sugar producing soils would rapidly deplete their fertility if adequate quantities were not returned to the farms in the form of fertilizer.

Systematic analyses of sugar mill products have shown that the molasses contains three-quarters of the total potash which comes in in the cane, one quarter of the phosphoric acid and nearly one-third of the nitrogen. These quantities (again based on a six million ton crop) when calculated to 1951 fertilizer values amount to the imposing total of £441,000. This represents a goodly proportion of the total amount spent annually by the sugar cane producers on fertilizers.

Let us examine the figures relating to the 1950 season. In that year 193,000 tons of molasses were produced by the 32 mills in this State. Of this amount less than 37,000 tons or some 19 per cent was used for fertilizer, the remaining 81 per cent being diverted to other uses. Slightly more than half was sold to distilleries, approximately the same amount as was used for fertilizer was sold for stock food, and eight per cent or 15,500 tons was burnt as mill fuel. The latter is a surprising figure in view of the surplus bagasse position at many factories.

I have advisedly used the words "wasted plant foods." They are wasted so far as the sugar industry is concerned and the very large quan-

* An address to the Annual Conference of the Australian Sugar Producers' Assn. on March 19th, 1952.

ties which go to distilleries are ultimately lost in spent wash and yeast cells. It is not claimed that the molasses sold to distilleries does not serve a useful purpose, but it is suggested that the sugar industry might give more consideration to its own economy by fostering recovery of the plant foods from distillery wastes. I am not in a position to know at what prices molasses is sold to distilleries but on 1951 fertilizer values f.o.r. Brisbane molasses is worth £3/5/- per ton. A fair allowance could be made for cartage to the farm to equalize rail freights and distribution of fertilizer.

It is claimed with justification that the sugar producer is experiencing a lean time. The value of his product has not kept pace with the rising costs of wages and materials. His gross income is limited by the factors of assigned acreage, cane price, varietal performance and soil productivity. There is little that he can do to increase his total earnings. He can, however, increase his net income by lowering costs of production. The soaring price of fertilizers is affecting the industry in two ways; it reduces the net earnings of the individual grower and in an attempt to cut down costs the grower is tempted to save some expenditure by purchasing a cheaper grade of fertilizer or by buying a lesser quantity. This is the start of a vicious downward spiral. At the present time the sugar producer has an obligation to fulfil certain commitments in Australia and abroad. This is the time for increased production—not for restriction. Every means of increasing tons of sugar per acre must be encouraged, and a method of improving net financial returns per acre is a very good form of encouragement.

The Bureau is very cognisant of the fact that its programme of research is very closely allied to industry economy. The control of a cane disease, the eradication of a pest, the qualities of a new variety are accept-

able to the industry only if they result in improved net income; an improved factory process which costs more than the value of the extra sugar recovered would naturally have no appeal. It is for this very reason that our studies on the value of molasses as a fertilizer formed the subject of this address. We feel that much expenditure now incurred in growing a crop can be reduced and we are convinced that outlay on fertilizer can be cut considerably by the intelligent use of molasses.

It is of interest and value to study the method of returning molasses to the farms, which is used by one large mill in Queensland. There all the molasses is sold to the growers but an endeavour has been made to make the material cover a larger acreage each year while at the same time rendering it more balanced in regard to plant foods. This is done by mixing the molasses with another by-product, the rotary filter cake in the proportions of 4 to 7. The advantages of such a mixture are firstly, the proportions are approximately in line with the amount of each product turned out by the factory and such an admixture allows the two by-products to be disposed of simultaneously. Secondly, the mixture has a much lower viscosity than the molasses and gives a relatively free flowing product which can be applied in lesser quantities per acre than either of the two ingredients separately. Thirdly the high potash and low phosphate in the molasses combined with low potash and high phosphate in the mud makes a suitable mixture for soils requiring a balanced fertilizer; the nitrogen content of the mixture is good. At 1951 fertilizer prices such a mixture would be worth £1/18/6 per ton and a five-ton per acre dressing would provide all the plant foods necessary for a heavy cane crop. This scheme is, in our opinion, almost the ideal in by-product usage. Annual fertility surveys carried out by this mill show that the

fertility of its district soils is increasing.

The growing awareness on the part of cane producers of the fertilizer value of molasses is causing a greater demand year by year for this product for use on soils. So long as such a demand exists a policy of disposing of molasses outside the mill area, for

any purpose, is shortsighted, and the export of soil nutrients is a sure road to soil bankruptcy. Rather should the factory owners recommend and encourage the return of *all* molasses to the land and make it available to growers at such a price as would be attractive compared with commercial fertilizers.

Procedure for Taking Soil Samples

Owing to differences in the fertility gradients of soil in different parts of a field, it is sometimes a difficult matter to obtain a sample which will truly represent the block of land under investigation and single samples taken at random are practically worthless. A number of sub-samples from different parts of the field under examination must therefore be taken and approximately equal weights of each mixed thoroughly to form the final sample. The number of sub-samples which should be taken and mixed to obtain such a representative sample will depend on the apparent variability of the soil but at least three samples should be taken and composited for the smallest area. For areas of 5 to 10 acres at least two samples per acre should be taken and composited.

One of the most convenient implements with which to sample the soil is a post hole digger, as this removes a complete portion in one operation. An ordinary $1\frac{1}{2}$ inch auger is good, provided the soil is sufficiently moist to cling to it firmly. If these implements are not available, a square hole should be dug to a depth of 10 inches, and after cleaning out the loose earth, a slice about 2 inches to 3 inches thick taken down one side of the hole from top to bottom. Such a sub-sample should then be placed on a bag or piece of canvas. Other sub-samples (of approximately similar weights) should be taken and added to the first one on the canvas and all mixed

thoroughly before taking the final sample, which should approximate two pounds.

Soils which appear markedly different must never be mixed, but each sampled for separate analysis. To obtain the most useful information from the analysis of the soil, it is necessary to take the sample just before or just after a cane crop is harvested and before the fertilizer is applied to the next crop. Samples should be taken from the space between the rows where there is less likelihood of contamination occurring from a previous application of fertilizer. Fallow blocks should not be sampled since the results do not always give a true indication of the immediate fertilizer requirement.

Samples should be forwarded to the Director, Bureau of Sugar Experiment Stations, William Street, Brisbane, and should be carefully marked. A letter should accompany all samples supplying information and details regarding the following:—

- Farmer's name and address;
- Drainage (good, bad, &c.);
- Surface soil (sandy, red volcanic &c.);
- Subsoil (heavy clay, sandy, &c.);
- Class of crop now on field (Q. plant, &c.);
- Is green manuring practised?;
- Usual fertilizer treatment;
- Has soil been limed?;
- Reasons why analysis is required

The Stick Planting Method

By N. G. GRAFF

While a large proportion of the sugar cane crop in Queensland is planted by use of the cutter planter and to a lesser extent by use of the drop planter, the majority of planting in the wet belt of Tully, Innisfail and Babinda, is carried out by means of the system known as "the stick planting method." The use of this method has not decreased to any great extent through the years, even though the cutter planter has become widely adopted in many centres, especially in Central and Southern areas.

The stick planting method consists of a number of separate operations:

- (a) Preparation of the field for planting.
- (b) Opening of the drills.
- (c) Laying of the cane in the drills.
- (d) Cutting of the cane into setts by hand.
- (e) Fertilizing and covering of the setts (either combined or performed as two separate operations).

Following land preparation, the furrows are opened by a drill plough or ploughs usually mounted directly onto a tractor or a strong grubber frame. The number of drills opened ahead of planting depends mainly on soil moisture, weather conditions, time and labour, whole fields often being "drilled out" when these conditions are favourable. The cane is carried to the field on a wide wheeled trailer, drawn by a tractor, or on a truck, which is run up the drills, often in the bottom of the furrows. The cane is then thrown into the drills, behind and to each side of the conveyance, so that fewer or more drills can be filled with each run. Contrary to expectations, it has been found that on most soil types and under normal conditions, the rows up which the truck or trailer has run, forming a hard packed base, produce a quicker and denser germination than the rows not compacted. Many farmers maintain that this improvement is still evident at time of harvesting the cane.



Fig. 93—Farm men distributing the full stalks in the previously opened drills.

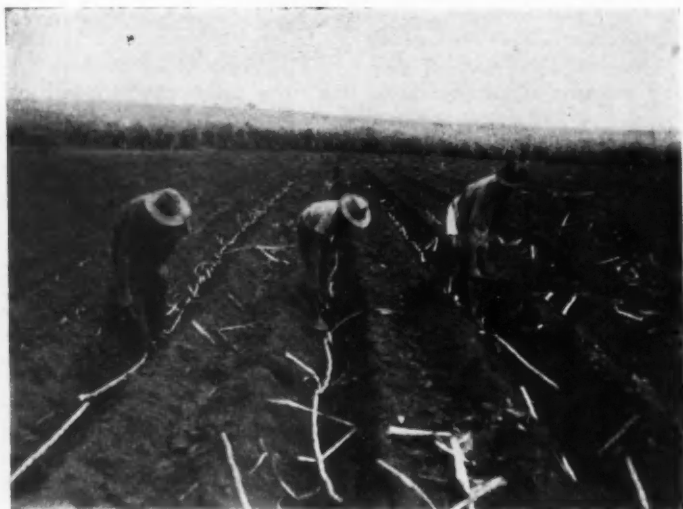


Fig. 84—Cutting the stalks into plants in the furrows. The operator stands on the stalk to steady it.



Fig. 85—The appearance of the field after cutting the stalks.

The cutting up of the cane into setts is carried out by hand, using cane knives. Due to the action of the workers' feet on the cane, while cutting it into setts, the sticks are kept steady and the cane setts can be kept parallel to the drill wall. This prevents the setts being uprooted by the scarifier, during subsequent covering. Also, the plants are placed in closer contact with the soil surface beneath, so that germination appears to be improved in a similar manner to that of the previously mentioned case.

A soil cover is then applied, either as a combined operation with fertilizing or as a separate procedure. Alternatively, the fertilizer may be applied in the open drills prior to the dropping of the cane, or as a post-germination application. Surface compaction of the furrows by a roller or rubber tyre, so as to improve germination further, is practised by some growers, depending upon conditions at the time of planting.

The stick method of planting may appear somewhat outdated, due to the number of separate operations when compared with the operation of the cutter planter. However, the method while producing good germinations, also lends itself admirably to local conditions and circumstances. This latter point is most evident when planting is marred by drizzling rain

and wet conditions, as is the case during the early planting period. Provided that drills have been opened, planting need not be interrupted, as dropping and cutting up of the cane in the drills may proceed, with crawler and broad wheel type tractors while a delay in covering of the plants is of little importance. Under such wet conditions a cutter planter is often



Fig. 86—Covering the cane plants and fertilizing in one operation.

useless for a long period. Again, doubtful weather and uncertain labour makes rapidity of planting of prime importance. Most growers find it necessary to combine forces and muster whatever labour is available. Hence the method suits either a small or a large gang of men, and with the latter a considerable area can be planted within the short space of two or three days.

Velvet Beans in Maryborough and Moreton Areas

By N. McD. SMITH

The success of velvet beans in the Bundaberg-Isis area is well known so that the performance of this green manure in Maryborough and Moreton districts will be of interest. Trial plots over the past two years have demonstrated the worth of the legume but the shortage of seed last year curtailed areas planted. As the supply position appears satisfactory this spring, growers are urged to acquire some seed for use under their par-

ticular conditions.

The variety recommended as the best yielder is Somerset and, as can be observed in the accompanying photographs, it is a prolific type. Green matter yield per acre of a good crop approximates 15 tons which is equivalent to 750 lb. of sulphate of ammonia per acre.

Planting time is from September to November dependent on weather conditions, and the seed is preferably

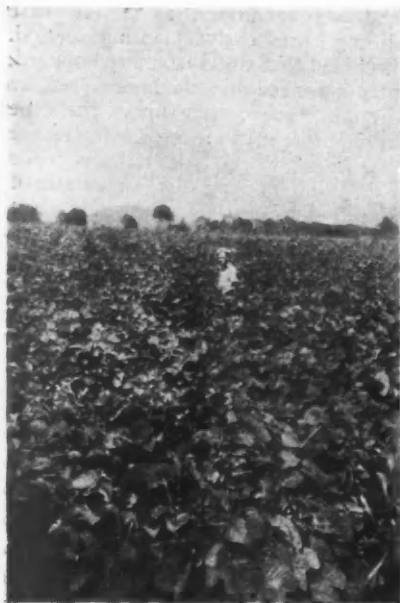


Fig. 87 — Somerset velvet beans on alluvial clay loam on the Maroochy River.

sown at the rate of 12 pounds per acre in rows approximately 4 feet 6 inches apart. Two cultivations are generally necessary before the plants begin to cover during the summer months. Should broadcasting suit farming methods, the rate of seeding approximates 40 pounds per acre and it has been found that the addition of 20 pounds per acre of Poona pea seed is an assistance in obtaining an early cover, which the velvet bean lacks.

As far as can be observed, the use of velvet bean is not limited to any particular soil type, and yields better than the standard green manures over all classes. Normally, the crop is turned under about April or May so that the material is well rotted by the following spring. Should it be desired to save seed the pods will mature about late July and may be picked in the pod, bagged and then threshed by a machine of the peg drum type. On wet sites, and particularly for the Moreton area it is recommended that seed plots should have a "nurse" crop of maize, over

which the beans can climb. This ensures that some of the clusters of pods do not contact the soil, otherwise attacks by fungi may render the seed useless. As an alternative to machine threshing, the pods may be spread on sheet metal and allowed to crack under the drying action of the sun and wind. To assist in the final separation of seed from the pod, the material may be bagged and beaten with a stick.

On Mr. B. C. Cunningham's farm at Bauple a matured crop which was ploughed under during September gave an excellent stand as a self sown crop, and this is illustrated in figure 88. Being such a prolific grower, the vines of the bean may appear to be a difficult proposition when ploughing under. This is not so where pneumatic tyred tractors are available, for the land wheels roll down the material for the next round of the plough. For those interested, secretaries of Mill Suppliers' Committees will furnish particulars of available sources of seed and quote prices.



Fig. 88 — A Volunteer crop on red forest loam at Bauple. Photograph was taken five months after the original crop had been ploughed in.

Flood Erosion Damage, Mackay District, 1951

By C. G. STORY

Soil erosion is a vicious process which destroys the essential productivity of our major natural resource—the land—and has an adverse effect on those who depend on the soil, as basically, the economic stability of this country depends on the value of its primary products. It is necessary that soil be retained and maintained for the present and future generations and for the security of the industry as a whole. The physical basis of agriculture is soil and the most vital portion is the topsoil which, unfortunately, is unstable under many conditions. One of these is the action of water, which in moving across the ground surface collects soil particles and carries them away in suspension. Under natural conditions, dense vegetation retards the movement of this soil so that new soil is formed from parent materials in the subsoil as rapidly as the topsoil is removed. However, an entirely different situa-

tion exists when the protective vegetation is cleared from the land surface as it is for cultivation; then the soil is exposed directly to the abrasive action and force of water. In the absence of this natural bulwark of vegetation, water frequently removes soil material a thousand times faster than under virgin conditions.

Soil is irreplaceable since once it leaves a field it is irretrievably lost from that particular area. The magnitude of the loss may be appreciated when it is realised that one acre of soil to a depth of seven inches amounts to approximately 900 tons, or 1,500 tons for the first foot of soil. It has been estimated that it would take nature, under the most favourable conditions, including a dense vegetative cover, from 200 to 1,000 years to build a single inch of topsoil from the raw material of the subsoil depending on climatic conditions and the nature of the subsoil. It is



Fig. 89.—Illustrating the hole which was scoured out on the farm of J. Stevens, Junr.

quite impracticable to restore soil after it is lost, as when soil is removed bodily from a field both the available and potential plantfoods plus temporarily inert material and everything composing the body of the soil is carried away. The ultimate fate for the field in this process of erosion is that stiff clay or subsoil of low productive capacity is exposed, the ability of the land to supply the moisture necessary for plant growth is generally impaired, the beneficial activity of micro organisms is lessened,

over sixty inches of rain were recorded in one week, with up to twenty inches on one day. The millions of tons of water which must have collected in the Pioneer Valley and its environs possessed a potential force for destruction, and this agricultural area was fortunate the damage was not greater. The water-soaked condition of the soils at the time of the heavy downpour was a contributing factor in the floods. The natural drainage system of the district was called upon in a very short period of



Fig. 90—Showing portion of the same hole after the water had disappeared. Note cane on left and right.

efficient tillage is rendered difficult, and finally the land is worthless and useless for crop production.

The displaced and transported soil is generally deposited in the ocean, harbours and river mouths while vast quantities of the less productive coarser material are frequently left in strips on river flats to bury the productive alluvial land.

It is not difficult to appreciate the extent of the damage from the torrential deluge of January, 1951, when

time to carry an enormously increased volume of water and unfortunately some of the waterways, including the Pioneer, were not in a condition to take care of the normal burden of flood water, as erosion debris and silting had reduced the carrying capacity of the streams and assisted in raising the crest of the floods. Instances are the silting along the lower reaches of the Pioneer and the necessity for levees along portions of the Proserpine River to protect farms and homes.

The water from this deluge, on its journey to the rivers and creeks, left gully erosion on cultivated fields, before it reached and increased the volume and velocity of the streams. These, as the crest of the flood rose, spread out over valuable alluvial areas and either removed large amounts of soil or deposited debris, sand and/or silt on cane crops. The extent of the damage varied but to those who suffered, the effects were far reaching and profound and they were left difficult and costly problems to solve. On the property of Mr. F. Stevens, Junior, Ilbilbie, three acres of rich alluvial flat were ruined as the flood water churned out a hole fourteen to sixteen feet deep and approximately half an acre in extent in the centre of this area; in addition it removed two feet of soil from the rest of the field. Directly across the creek in the path of this rushing torrent was a twenty-five acre alluvial flat which suffered various types of damage.

A stone wall four feet high with a wide base, built on top of the bank of the creek to assist in flood control, collapsed like a pack of cards and the rocks were scattered; a gully with an area of one acre was cut through the field by the waters in short circuiting a bend in the creek; silt to a depth of fifteen feet was deposited in a small portion and at the other end of the field silt deposited in the heart ruined a large acreage of cane.

At Chelona, Sandy Creek rose to within five feet of the decking of the bridge—normally low water is forty feet from the decking. Just below the bridge the swirling water cut a channel twenty five chains long to the east from the normal bank. The last twelve chains of this channel was gouged to a depth of twelve feet with width of two chains through eleven acres of cane land on a rich alluvial flat. It also deposited feet of coarse sand over the cane field and adjacent

areas. The erosion has ruined this eleven acre field and portions of the neighbouring property. Tea trees, twenty to thirty feet long, two feet thick at the butt, were carried fifty chains and left on a high bank on a neighbouring property. Unfortunately ordinary tides now allow salt water to flow the length of the channel and future floods will aggravate the situation.

The water from the 1951 flood was not so high as that from the 1918 flood, but there was more fresh water in the creek. The instances quoted and others, numerous in the central



Fig. 91—The channel which was cut on C. Hudson's farm at Chelona.

area, are tragic both for the cane-grower concerned and for the district as a whole. Most of the land was originally rich alluvial scrub country with a high productive capacity, but these eroded areas are now practically non productive.

An interesting type of water erosion was that caused by the development of an underground spring on the property of Mr. R. J. Higham, Finch Hatton. This was responsible for an eroded area twelve feet deep, fifty feet long by twenty feet wide, portion of which is shown in Figure 5. Water from the spring may be noticed in the photographs.



Fig. 92—Sand deposited on the channel area to a depth of five feet. The good alluvial soil has been covered.

River and creek erosion which is accentuated during such periods of excessively heavy rain cannot be prevented by the normal methods of soil conservation. The cost of protection of stream banks by such methods as construction of groins or levees puts them beyond the resources of the individual farmer. Such work becomes a district or State responsibility. Nevertheless it must be admitted that much of the flood erosion damage caused was contributed to by the indiscriminate clearing of all timber and vegetation from the immediate banks and from the adjacent strip of vulnerable land. The roots of trees, grasses and other vegetation provide the best means of holding soil against the action of moving water. All stream banks should be



Fig. 93—Erosion caused by an underground spring on R. J. Higham's property at Finch Hatton.

protected with rapidly growing vegetation which will help in resisting the eroding action of flooded streams. The tops of banks should be planted with trees so as to break down the velocity of water when the banks are overflowed and the strip of adjacent land should be grassed. These measures ensure to some extent that flood waters reaching adjacent cane lands have lost a lot of their velocity and that the damage will be minimised.

Agriculture 3,500 Years Ago

The Scientific American has recently published an interesting piece of agricultural history. During archaeological excavations in 1949-50 near the site of the present city of Baghdad an inscribed clay tablet was unearthed and has since been translated. It was found to contain 35 lines from the middle of an agricultural handbook of which eight other fragments and tablets had previously been discovered. The total document, 108 lines in length, consists of a series of instructions from a farmer to his son.

The following literal translation is given of the more intelligible passages:—

"In days of yore a farmer gave (these) instructions to his son: When you are about to cultivate your field, take care to open the irrigation works (so that) their water does not rise too high in it (the field). When you have emptied it of water, watch the field's wet ground that it stays even; let no wandering ox trample it. Chase the prowlers and have it treated as settled land. Clear it with ten narrow axes (weighing no more than) two-thirds of a pound each. Its stubble (?) should be torn up by hand and tied in bundles; its narrow holes shall be gone over with a drag; and the four sides of the field shall be fenced about. While the field is burning (in the summer sun) let it be divided up into equal parts. Let your tools hum with activity (?). The yoke-bar should be made fast, your new whip should be fastened with nails, and the handle to which your old whip was fastened should be mended by the workers' children . . .

"When you are about to plow the field, keep your eye on the man who puts in the seed that he let him drop the grain uniformly two fingers deep, and use up one shekel-weight (a sixteenth of a pound) for each strip of

nineteen and a half feet. If the seed does not sink in properly change your knife, 'the tongue of the plow' . . . Plow diagonally where you have ploughed straight, and plow straight where you have plowed diagonally . . . All the clods must be carried off . . . and everything should be made favorable for the sprouting grain. When the sprouting grain has broken through the earth, say a prayer to Ninkilim (the goddess of insects and rodents). Also shoo away the birds. When the grain has filled the narrow bottom of the furrow, pour water over the top seed. When the grain stands high as (the straw in a) mat covering the middle of a boat, pour water over it. Pour water on its (the field's) 'royal' grain. If the moistened grain turns red, it is sick with the *samanu* disease. When it produces (once again) healthy (?) grain, water it (a fourth time); it will then produce for you one extra measure in ten of pure grain. When you are about to harvest the grain, let not the grain bend over (of its own weight); harvest it in the moment of its ripeness. One man reaps, one bundles the grain, and one piles it up before him; let three harvest (as a team) . . .

"Guide your (threshing) wagon; make the oxen of your threshing wagon go up over the grain mounds. Your threshing lasts five days . . . When the grain is heaped up on the ground say a prayer for the soiled grain. When you winnow the grain with pitchforks, pay attention to the man who lifts the grain from the ground; there should be two men who lift the grain. If the grain has become soiled, lay it on sticks. Say a prayer against the harshness of the evening and night. Free the grain of impurities like the clear day.

"(These are) the instructions of (the god) Ninurta, the son of Enlil.

O Ninurta, farmer of the gods, your praise is good."

To agricultural scientists and farmers both it is of more than passing interest to note the attention paid by the grower of 3,500 years ago to such points as controlled irrigation, plant diseases, plough-setting and general

land preparation. Crop production has advanced a long way in thirty-five centuries, but one can hardly claim after reading the above advice that the methods then in use were based on ignorance of good farming.

N.J.K.

Disease Resistance Sub-Station

Some three years ago the Bureau began running its disease resistance trials on new varieties on a small area of land at Moggill—some ten miles from Brisbane—which belonged to the University. This step was rendered necessary by the virtual disappearance of certain of our once major diseases from commercial cane areas in Queensland. It was obviously undesirable to continue such trials, involving the growing of diseased material, in sugar districts where the disease had been eradicated after considerable effort. At the same time the concentration of such trials in a compact area near Brisbane allowed much closer supervision by the Bureau pathologists.

Recently the testing of all new canes for disease susceptibility or re-

sistance has been placed on a sounder and more satisfactory basis. A property was purchased at Eight Mile Plains and all work of this nature will, in future, be conducted there. The land is a good quality light sandy loam, above frost level, adequately supplied with irrigation water and equipped with buildings, irrigation plant, spray lines, etc. The trials in progress at Moggill will be pursued to completion but all 1952 and subsequent plantings will be made on the newly acquired property. It is felt that the possession of its own farm with a resident overseer will enable the Bureau to carry out such important work more satisfactorily and with greater ultimate benefit to the industry.

—N.J.K.

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